

## WHAT IS CLAIMED IS:

1. A method of producing a coated substrate comprising the steps of:
  - a) forming a free flowing curtain, the curtain having a first component and a second
  - 5 component capable of reacting with each other, and
  - b) contacting the curtain with a continuous web substrate.
2. The method of Claim 1, wherein the method comprises the steps of:
  - a) forming a composite, multilayer free flowing curtain, the curtain having at least two
  - 10 layers, whereby one layer comprises a first component which is capable of reacting with a second component in a different layer, and
  - b) contacting the curtain with a continuous web substrate.
3. The method of Claim 2, wherein in the multilayer free flowing curtain of step a) at
- 15 least one internal layer is present between the layer comprising the first component and the layer comprising the second component.
4. The method of Claim 1, wherein the reaction type of which the first component and the second component of step a) react with each other is selected from the group consisting
- 20 of anionic-cationic-interaction, crosslinking reaction, free radical reaction, step growth reaction, addition reaction, UV induced curing reaction, electron beam induced curing reaction, acid-base reaction, flocculation/coagulation reaction and combinations thereof.
5. The method of Claim 1, comprising the steps of:
  - 25 a) forming a free flowing curtain, the curtain having at least one layer comprising a composition capable of reacting, and
  - b) contacting the curtain with a continuous web substrate.
6. The method of Claim 5, comprising the steps of:
  - 30 a) forming a free flowing curtain, the curtain having at least one layer comprising a first component and a second component capable of reacting with each other, and
  - b) contacting the curtain with a continuous web substrate.

7. The method of Claim 1, characterized in that in step a) the first component is an amino silane ester and the second component is a glycidyl silane ester.
8. The method of Claim 1, wherein the free flowing curtain of step a) is a composite,  
5 multilayer free flowing curtain.
9. The method of Claim 1, wherein the reaction between the first component and the second component of step a) takes place in the free flowing curtain and/or when applied to the substrate and/or when initiated by heat, pressure, radiation, and/or oxygen.
10. The method of Claim 1, wherein in step a) the first component is a polyvinyl alcohol and the second component is borax.
11. The method of Claim 1, wherein in step a) the first component is cationic starch and  
15 the second component is an anionic coating composition.
12. The method of Claim 1, wherein the free flowing curtain of step a) comprises a top layer ensuring printability.
- 20 13. The method of Claim 1, wherein the continuous web substrate of step b) has a grammage of from about 20 to about 400 g/m<sup>2</sup>.
14. The method of Claim 1, wherein at least one of the layers of the multilayer curtain of step a) has a coatweight when dried of less than about 30 g/m<sup>2</sup>.
- 25 15. The method of Claim 1, wherein the multilayer curtain of step a) has a coatweight when dried of less than about 60 g/m<sup>2</sup>.
16. The method of Claim 1, wherein the multilayer curtain of step a) comprises at least 3  
30 layers.

17. The method of Claim 1, wherein the multilayer curtain of step a) comprises at least one layer comprising at least one pigment.

18. The method of Claim 17, wherein the pigment is selected from the group consisting of clay, kaolin, calcined clay, talc, calcium carbonate, titanium dioxide, satin white, synthetic polymer pigment, zinc oxide, barium sulfate, gypsum, silica, alumina trihydrate, mica, and diatomaceous earth.

19. The method of Claim 1, wherein at least one layer of the multilayer free flowing curtain of step a) comprises a binder.

20. The method of Claim 19, wherein the binder is selected from the group consisting of styrene-butadiene latex, styrene-acrylate latex, styrene-acrylate-acrylonitrile latex, styrene-butadiene-acrylate-acrylonitrile latex, styrene-maleic anhydride latex, styrene-acrylate-maleic anhydride latex, polysaccharides, proteins, polyvinyl pyrrolidone, polyvinyl alcohol, polyvinyl acetate, cellulose derivatives and mixtures thereof.

21. The method of Claim 1, wherein at least one layer of the multilayer free flowing curtain of step a) comprises at least one optical brightening agent.

22. The method of Claim 1, wherein at least one layer of the multilayer free flowing curtain of step a) comprises at least one surfactant.

23. The method of Claim 1, wherein at least one layer of the multilayer free flowing curtain of step a) has a solids content of at least about 40 wt.%.  
24. The method of Claim 1, wherein the multilayer free flowing curtain of step a) has a solids content of at least about 10 wt.%.  
25. The method of Claim 1, wherein the continuous web substrate of step b) is a basepaper or a paperboard.

26. The method of Claim 1, wherein the continuous web substrate of step b) is neither precoated nor precalendered.
27. The method of Claim 1, wherein the continuous web substrate of step b) has a web  
5 velocity of at least about 300 m/min.
28. A coated substrate obtainable by the method of Claim 1.
29. A coated substrate according to Claim 28, wherein the coated substrate is coated  
10 paper or paperboard.
30. A process for producing a coated substrate comprising the steps of:  
a) forming a free flowing curtain, the curtain having at least one component capable of  
reacting with itself or another compound, and  
15 b) contacting the curtain with a continuous web substrate,  
wherein at least one component of the curtain begins reacting during the coating process  
and is essentially completely reacted before the coating process is complete.
31. The method of Claim 30, comprising the steps of:  
20 a) forming a free flowing curtain, the curtain having at least one layer comprising a first  
component and a second component capable of reacting with each other, and  
b) contacting the curtain with a continuous web substrate.
32. The method of Claim 30, wherein the free flowing curtain of step a) is a composite,  
25 multilayer free-flowing curtain.
33. The method of Claim 31, wherein the reaction type of which the first component and  
the second component of step a) react with each other is selected from the group consisting  
of anionic-cationic-interaction, free radical reaction, step growth reaction, addition reaction,  
30 UV induced curing reaction, electron beam induced curing reaction, acid-base reaction,  
flocculation/coagulation reaction and combinations thereof.

34. The method of Claim 31, wherein the reaction between the first component and the second component of step a) takes place in the free flowing curtain and/or when applied to the substrate and/or when initiated by heat, radiation, and/or oxygen.
- 5 35. The method of Claim 30, wherein the free flowing curtain of step a) comprises a top layer ensuring printability.
36. The method of Claim 32, wherein at least one of the layers of the multilayer curtain of step a) has a coatweight when dried of less than about 30 g/m<sup>2</sup>.
- 10 37. The method of Claims 32, wherein the multilayer curtain of step a) has a coatweight when dried of less than about 60 g/m<sup>2</sup>.
38. The method of Claim 32, wherein the multilayer curtain of step a) comprises at least  
15 3 layers.
39. The method of Claim 32, wherein the multilayer curtain of step a) comprises at least one layer comprising at least one pigment.
- 20 40. The method of Claim 39, wherein the pigment is selected from the group consisting of clay, kaolin, calcined clay, talc, calcium carbonate, titanium dioxide, satin white, synthetic polymer pigment, zinc oxide, barium sulfate, gypsum, silica, alumina trihydrate, mica, and diatomaceous earth.
- 25 41. The method of Claim 32, wherein at least one layer of the multilayer free flowing curtain of step a) comprises a binder.
42. The method of Claim 41, wherein the binder is selected from the group consisting of styrene-butadiene latex, styrene-acrylate latex, styrene-acrylate-acrylonitrile latex, styrene-butadiene-acrylate-acrylonitrile latex, styrene-maleic anhydride latex, styrene-acrylate-maleic latex, styrene-acrylate-maleic anhydride latex, polysaccharides, proteins, polyvinyl pyrrolidone, polyvinyl alcohol, polyvinyl acetate, cellulose derivatives and mixtures thereof.
- 30

43. The method of Claim 32, wherein at least one layer of the multilayer free flowing curtain of step a) comprises at least one optical brightening agent.
44. The method of Claim 32, wherein at least one layer of the multilayer free flowing curtain of step a) comprises at least one surfactant.
45. The method of Claim 32, wherein at least one layer of the multilayer free flowing curtain of step a) has a solids content of at least about 40 wt.%.
46. The method of Claim 32, wherein the multilayer free flowing curtain of step a) has a solids content of at least about 10 wt.%.
47. The method of Claim 30, wherein the continuous web substrate of step b) is a basepaper or a paperboard.
48. The method of Claim 30, wherein the continuous web substrate of step b) is neither precoated nor precalendered.
49. The method of Claim 30, wherein the continuous web substrate of step b) has a web velocity of at least about 300 m/min.
50. The method of Claim 30, wherein the continuous web substrate of step b) has a grammage of from about 20 to about 400 g/m<sup>2</sup>.
51. A coated substrate obtainable by the method of Claim 30.
52. A coated substrate according to Claim 30, wherein the coated substrate is coated paper or paperboard.
53. The method of Claim 30, wherein the curtain contains one reactive component, and wherein the reaction of the reactive component is initiated by an initiating means external to

the curtain selected from the group consisting of heat, radiation, pressure, or a combination thereof.

54. The method of Claim 1, wherein the multilayer curtain of step a) comprises at least 4 layers.

55. The method of Claim 1, wherein the multilayer curtain of step a) comprises at least 5 layers.

56. The method of Claim 1, wherein the multilayer curtain of step a) comprises at least 6 layers.

57. The method of Claim 1, wherein the continuous web substrate of step b) has a web velocity of at least about 400 m/min.

58. The method of Claim 1, wherein the continuous web substrate of step b) has a web velocity of at least about 500 m/min.

59. The method of Claim 32, wherein the multilayer curtain of step a) comprises at least 4 layers.

60. The method of Claim 32, wherein the multilayer curtain of step a) comprises at least 5 layers.

61. The method of Claim 32, wherein the multilayer curtain of step a) comprises at least 6 layers.

62. The method of Claim 30, wherein the continuous web substrate of step b) has a web velocity of at least about 400 m/min.

63. The method of Claim 30, wherein the continuous web substrate of step b) has a web velocity of at least about 500 m/min.

64. The method of Claim 1, wherein the curtain is formed with a slot die.
65. The method of Claim 1, wherein the curtain is formed with a slide die.
- 5 66. The method of Claim 1, wherein at least one layer of the curtain comprises polyethylene oxide.
67. The method of Claim 1, wherein the curtain comprises polyethylene oxide in the interface layer.
- 10 68. The method of Claim 30, wherein the curtain is formed with a slot die.
69. The method of Claim 30, wherein the curtain is formed with a slide die.
- 15 70. The method of Claim 30, wherein at least one layer of the curtain comprises polyethylene oxide.
71. The method of Claim 30, wherein the curtain comprises polyethylene oxide in the interface layer.
- 20 72. A method of Claim 1, characterized in that in step a) the first component is a starch and the second component is a dialdehyde.
73. A method of Claim 1, characterized in that in step a) the first component is an epoxy-functional polymer and the second component is an amine hardening agent.
- 25 74. A method of Claim 1, characterized in that in step a) the first component is a polyol and the second component is a polyisocyanate.